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Summary Estimates of Forest Resources on Unreserved Lands of the Chatham Inventory Unit, Tongass National Forest, Southeast Alaska, 1998

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Abstract

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Summary estimates are presented of forest resource area, timber volume, and growth and mortality of timber on unreserved national forest land in the Chatham inventory unit of the Tongass National Forest. Pacific Northwest Research Station, Forest Inventory and Analysis crews collected inventory data from 1995 to 2000. Productive forest land area (timberland) was estimated at 1,302 thousand acres, cubic-foot volume on timberland at 7,561 million cubic feet, and net annual growth and mortality at 31,613 and 28,341 thousand cubic feet, respectively.

Keywords: Forest surveys, timber resources, statistics (forest), Alaska (southeast), Chatham.

Summary

The total land and water area of the Chatham inventory unit of the Tongass National Forest is 8,140,000 acres. Unreserved lands within the area encompass 5,380,341 acres, 66 percent of the total. Thirty-seven percent (2,011,602 acres) of this unreserved area is forested and almost 65 percent of the forest land is timberland (1,302,152 acres). Cubic-foot volume on timberland is estimated at about 7.5 billion cubic feet. Nearly 82 percent of this volume is in western hemlock and Sitka spruce trees. Net annual growth of growing stock on timberland is estimated at 31.6 million cubic feet and average annual mortality is about 28.3 million cubic feet.

Preface

Forest Inventory and Analysis (FIA) is a nationwide project of the USDA Forest Service authorized by the Forest and Rangeland Renewable Resources Research Act of 1978. Work units, located at Forest Service research and experiment stations, conduct forest resource inventories throughout the 50 states. The FIA program of the Pacific Northwest Research Station is responsible for forest inventories in Alaska, Washington, Oregon, California, Hawaii, and the Pacific Trust Islands.

Inventory Area

The forest resources on unreserved, national forest lands within the Chatham inventory unit (fig. 1) were sampled with a single-phase, unstratified, systematic grid sample (grid spacing is 2.98 miles). No ground sampling occurred in wilderness areas. Ground plots (2.47 acres) were established at each grid intersection and were subsampled by a cluster of four, 24-foot, fixed-radius subplots. Three other subplots were sited, one each at 120 feet north, southeast, and southwest from the first, centrally located subplot. Each subplot was mapped for land cover.

Some plots were either entirely or partially physically inaccessible owing to dangerous terrain. For these locations, land cover was estimated; detailed measurements of trees and other vegetation were not made. These locations contribute to estimates of other forest land and nonforest area.

Sampling Error

Estimates presented in this report are based on sampling and are subject to two types of error. The first is sampling error. This type of error can be estimated mathematically. The second type of error comes from measurement mistakes or equipment limitations; it cannot be estimated mathematically but is minimized through proper training, supervision, and emphasis on careful work.

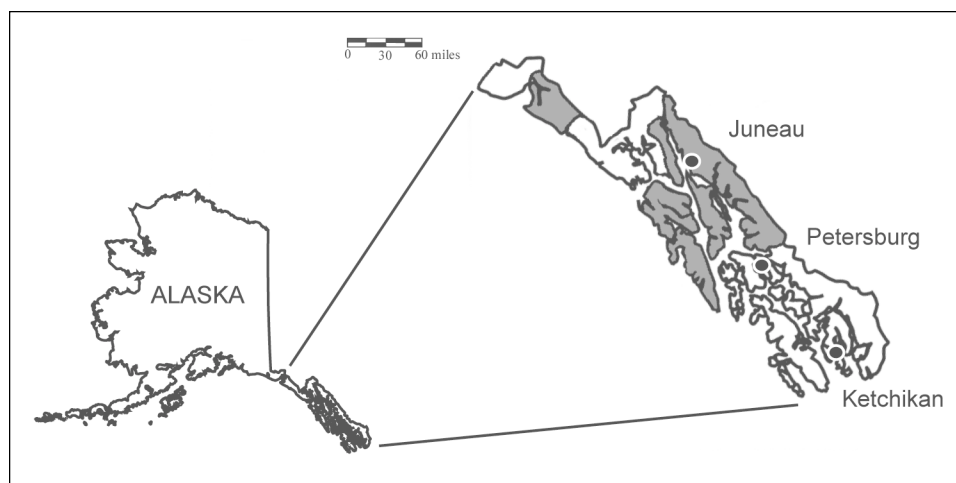


Figure 1—Chatham inventory unit, southeast Alaska, 1998.

Table 1—Bootstrap estimates of the standard error for selected forest resource estimates, Chatham inventory unit, southeast Alaska, 1998

Resource	Estimate	Standard error
Productive acres	1,302,152	71,726
Nonproductive acres	709,450	59,047
Nonforest acres	3,368,739	82,717
Net volume (ft ³)	7,561,291,112	536,971,963
Gross growth (ft ³)	59,953,509	3,863,259

Bootstrap estimation was used to estimate sampling error. The bootstrap process is an iterative resampling, with replacement, of the sample list. For each sample, a new estimate of the total is constructed. The variances of the estimated totals provide the estimate of standard error. The estimated errors presented in table 1 resulted from 1,000 iterations. Sixty-eight percent confidence bands (one standard error) can be calculated from these figures.

Key Findings

- Thirty-seven percent of the Chatham inventory unit's unreserved land base of 5,380 thousand acres was classified as forest land (2,012 thousand acres). Sixty-five percent of this forest land was timberland (1,302 thousand acres) (fig. 2).
- Western hemlock and Sitka spruce dominate the forest type composition of the Chatham inventory unit's timberland component.¹ As pure types, western hemlock and Sitka spruce comprise 37 and 22 percent, respectively, of the net cubic-foot volume on timberland. Mixed western hemlock/Sitka spruce stands account for an

¹Scientific names for all trees are given in the appendix.

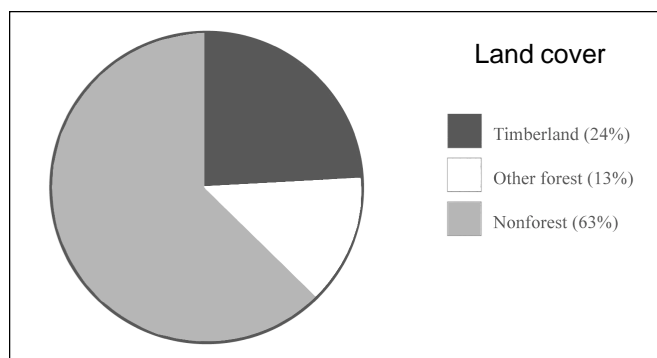


Figure 2—Area of land, by land cover, unreserved national forest land, Chatham inventory unit, southeast Alaska, 1998.

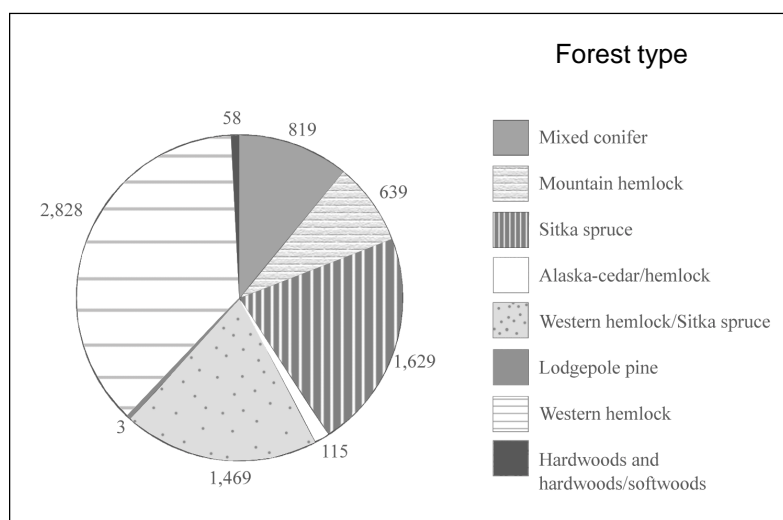


Figure 3—Net volume of growing stock (million cubic feet) on timberland by forest type, unreserved national forest land, Chatham inventory unit, southeast Alaska, 1998.

additional 19 percent of the net cubic-foot volume (fig. 3). Forty-six percent of the net cubic volume, by species, is in western hemlock trees; 36 percent is in Sitka spruce trees. The highest net cubic volumes per acre were found in stands of the Sitka spruce forest type, where average volume per acre was estimated at 7,994 cubic feet.

- Average annual mortality did not exceed gross annual growth for any forest type in the Chatham inventory unit (fig. 4). Total net annual growth for all forest types was estimated at 31,613 thousand cubic feet. Gross annual per-acre growth in the Sitka spruce forest type (67 cubic feet per acre) exceeded that in all other forest types.

Glossary

Forest land—Land at least 16.7 percent stocked by live trees of any size, or land formerly having such tree cover and not currently developed for nonforest use. The minimum area for classification as forest land or subclasses of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must be at least 120 feet wide to be classified as forest land. Unimproved roads and trails, streams, and clearings in forest areas must be less than 120 feet wide to be classified as forest land. (See also timberland, other forest land, reserved forest land, and nonforest land.)

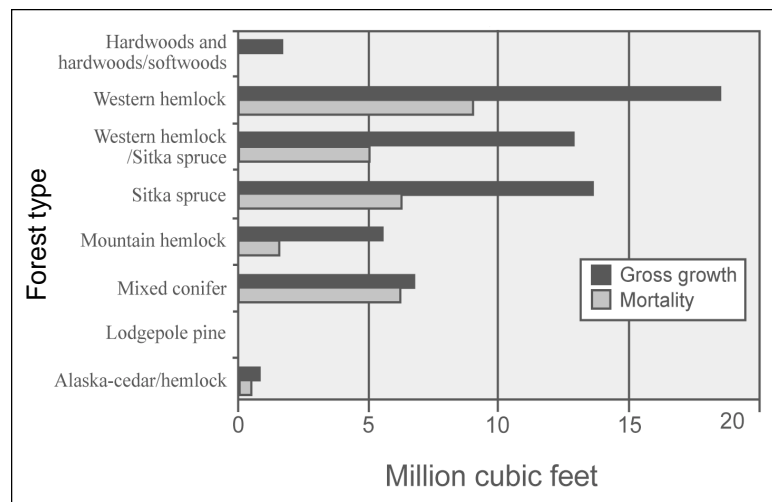


Figure 4—Gross annual growth and average annual mortality of growing stock on timberland by forest type, unreserved national forest land, Chatham inventory unit, southeast Alaska, 1998.

Forest type—A classification of forest land based on the species forming a plurality of stocking on the area currently occupied by tree cover.

Growing stock volume—Net volume in cubic feet of live sawtimber and poletimber growing stock trees from stump to a minimum 4.0-inch top (of central stem) outside the bark. Net volume equals gross volume less deductions for rot and missing bole sections.

Land class—A classification of land by major use, such as timberland, other forest, or nonforest. The minimum size area for classification is 1 acre.

Mean annual increment (m.a.i.)—A measure of the productivity of forest land in terms of the average increase in cubic-foot volume per acre per year. The minimum standard for timberland is the ability to produce 20 cubic feet per acre per year at culmination of m.a.i.

Mortality, average annual, of growing stock—The volume of sound wood in live sawtimber and poletimber trees dying annually from natural causes during the 5 years prior to measurement.

Net annual growth—The increase in net volume of wood for growing stock trees during a specified year. Components of net annual growth are (a) the increment in net volume of trees alive at the beginning of the specified year, plus (b) the net volume of trees reaching sawtimber or poletimber size during the year, minus (c) the net volume of trees that died during the year.

Net volume—The gross volume of a tree less deductions for rot, sweep, or other defect affecting product use.

Nonforest land—Land that does not qualify as forest land. Includes land that has never supported forests and lands formerly forested where forest use is precluded by development for nonforest uses. Included are lands used for agricultural crops, improved pasture, residential areas, city parks, improved roads, operating railroads and their right-of-way clearings, and pipeline clearings. If intermingled in forest areas, unimproved roads, streams, canals, and nonforest strips must be more than 120 feet wide, and clearings or other areas must be 1 acre or larger to qualify as nonforest land.

Other forest land—Forest land not capable of producing 20 cubic feet per acre per year or more of wood at culmination of mean annual increment (m.a.i.) and not withdrawn from timber use by administrative statute.

Productive forest land—Forest land producing or capable of producing 20 cubic feet per acre per year or more of wood at culmination of mean annual increment (m.a.i.).

Poletimber trees—Growing stock trees greater than 5.0 inches in diameter at breast height and less than sawtimber sized.

Reserved forest land—Forest land withdrawn from timber utilization through statute or administrative regulation.

Sawtimber trees—Growing stock trees at least 11.0 inches in diameter at breast height for hardwoods and 9.0 inches for softwoods.

Timberland—Forest land producing or capable of producing 20 cubic feet per acre per year or more of wood at culmination of mean annual increment (m.a.i.) and not withdrawn from timber use by administrative statute.

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Literature Cited

Viereck, L.A.; Little, E.E., Jr. 1972. Alaska trees and shrubs. Agric. Handb. 410. Washington, DC: U.S. Department of Agriculture. 265 p.

Appendix

Names of trees²

Common name	Scientific name
Softwoods:	
Alaska-cedar	<i>Chamaecyparis nootkatensis</i> (D. Don) Spach
Lodgepole pine	<i>Pinus contorta</i> (Dougl.) ex Loud.
Mountain hemlock	<i>Tsuga mertensiana</i> (Bong.) Carr.
Pacific silver fir	<i>Abies amabilis</i> (Dougl.) ex Forbes
Sitka spruce	<i>Picea sitchensis</i> (Bong.) Carr.
Western hemlock	<i>Tsuga heterophylla</i> (Raf.) Sarg.
Western redcedar	<i>Thuja plicata</i> (Donn) ex D. Don
Hardwoods:	
Black cottonwood	<i>Populus trichocarpa</i> Torr. & Gray
Paper birch	<i>Betula papyrifera</i> Marsh.
Red alder	<i>Alnus rubra</i> Bong.

² Scientific names according to Viereck and Little (1972).

Table 2—Area by land class, unreserved national forest land, Chatham inventory unit, southeast Alaska, 1998^a

Land class				
Timberland	Other forest land	Total forest land	Nonforest land	All land
<i>Thousand acres</i>				
1,302 (24.2%)	709 (13.1%)	2,012 (37.4%)	3,369 (62.6%)	5,380 (100%)

^a Totals may be off due to rounding. Estimates are subject to sampling error.

Table 3—Area of timberland by forest type, unreserved national forest land, Chatham inventory unit, southeast Alaska, 1998^a

Forest type	----- Area -----	
	<i>Thousand acres</i>	<i>Percent</i>
Softwoods:		
Alaska-cedar/hemlock	25	1.9
Lodgepole pine	7	.5
Mixed conifer	183	14.1
Mountain hemlock	145	11.1
Sitka spruce	204	15.7
Western hemlock/Sitka spruce	274	21.0
Western hemlock	418	32.1
Total, softwoods	1,256	96.4
Hardwoods:		
Poplar	23	1.8
Red alder	6	.5
Total, hardwoods	29	2.2
Mixed:		
Poplar-spruce	17	1.3
Total, mixed	17	1.3
All types	1,302	100.0

^a Totals may be off due to rounding. Estimates are subject to sampling error.

Table 4—Net volume of growing stock on timberland by species, unreserved national forest land, Chatham inventory unit, southeast Alaska, 1998^a

Species	----- Volume -----	
	<i>Thousand ft³</i>	<i>Percent</i>
Softwoods:		
Alaska-cedar	524,484	6.9
Lodgepole pine	5,554	<i>t</i>
Mountain hemlock	753,179	10.0
Pacific silver fir	4,265	<i>t</i>
Sitka spruce	2,715,593	35.9
Western hemlock	3,486,750	46.1
Western redcedar	1,563	<i>t</i>
Total, softwoods	7,491,388	99.1
Hardwoods:		
Black cottonwood	52,082	.7
Paper birch	2,602	<i>t</i>
Red alder	15,220	.2
Total, hardwoods	69,904	.9
All types	7,561,291	100.0

t = trace.

^a Totals may be off due to rounding. Estimates are subject to sampling error.

Table 5—Net volume of growing stock on timberland by forest type, unreserved national forest land, Chatham inventory unit, southeast Alaska, 1998^a

Forest type	----- Volume -----		
	<i>Thousand ft³</i>	<i>Percent</i>	<i>Ft³/ acre</i>
Softwoods:			
Alaska-cedar/hemlock	115,371	1.5	4,591
Lodgepole pine	2,845	<i>t</i>	409
Mixed conifer	819,207	10.8	4,472
Mountain hemlock	639,105	8.5	4,418
Sitka spruce	1,629,415	21.5	7,994
Western hemlock/Sitka spruce	1,469,048	19.4	5,364
Western hemlock	2,828,459	37.4	6,767
Total, softwoods	7,503,450	99.2	5,976
Hardwoods:			
Poplar	16,917	.2	733
Red alder	9,347	.1	1,515
Total, hardwoods	26,264	.3	898
Mixed:			
Poplar-spruce	31,577	.4	1,825
Total, mixed	31,577	.4	1,825
All types	7,561,291	100.0	5,807

t = trace.

^a Totals may be off due to rounding. Estimates are subject to sampling error.

Table 6—Gross annual growth of growing stock on timberland by forest type, unreserved national forest land, Chatham inventory unit, southeast Alaska, 1998^a

Forest type	----- Growth -----	
	<i>Cubic feet</i>	<i>Ft³/ acre</i>
Softwoods:		
Alaska-cedar/hemlock	870,100	35
Lodgepole pine	23,728	3
Mixed conifer	6,804,810	37
Mountain hemlock	5,470,277	38
Sitka spruce	13,669,579	67
Western hemlock/Sitka spruce	12,886,339	47
Western hemlock	18,526,870	44
Total, softwoods	58,251,703	46
Hardwoods:		
Poplar	311,245	13
Red alder	499,011	81
Total, hardwoods	810,256	28
Mixed:		
Poplar-spruce	891,551	52
Total, mixed	891,551	52
All types	59,953,509	46

^a Totals may be off due to rounding. Estimates are subject to sampling error.

Table 7—Net annual growth of growing stock on timberland by forest type, unreserved national forest land, Chatham inventory unit, southeast Alaska, 1998^a

Forest type	----- Growth -----	
	<i>Cubic feet</i>	<i>Ft³/ acre</i>
Softwoods:		
Alaska-cedar/hemlock	517,658	21
Lodgepole pine	23,728	3
Mixed conifer	661,348	4
Mountain hemlock	3,964,765	27
Sitka spruce	7,375,531	36
Western hemlock/Sitka spruce	7,879,663	29
Western hemlock	9,503,647	23
Total, softwoods	29,926,339	24
Hardwoods:		
Poplar	311,245	13
Red alder	499,011	81
Total, hardwoods	810,256	28
Mixed:		
Poplar-spruce	876,346	51
Total, mixed	876,346	51
All types	31,612,940	24

^a Totals may be off due to rounding. Estimates are subject to sampling error.

Table 8—Average annual mortality of growing stock on timberland by forest type, unreserved national forest land, Chatham inventory unit, southeast Alaska, 1998^a

Forest type	----- Mortality -----	
	<i>Cubic feet</i>	<i>Ft³/ acre</i>
Softwoods:		
Alaska-cedar/hemlock	352,442	14
Lodgepole pine	—	—
Mixed conifer	6,143,462	34
Mountain hemlock	1,505,511	10
Sitka spruce	6,294,048	31
Western hemlock/Sitka spruce	5,006,676	18
Western hemlock	9,023,223	22
Total, softwoods	28,325,363	23
Hardwoods:		
Poplar	—	—
Red alder	—	—
Total, hardwoods	—	—
Mixed:		
Poplar-spruce	15,205	1
Total, mixed	15,205	1
All types	28,340,568	22

— = no data were collected.

^a Totals may be off due to rounding. Estimates are subject to sampling error.

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